

9

LIVING THINGS —PLANTS

REVISED
EDITION

CONTENTS

	<i>Page</i>
Introduction	5
Types of plants	5
Parts of a flowering plant	6
Plants have different types of leaves	8
Plants have different types of stems	12
Plants have different types of roots	14
Plants have flowers	16
Flowers become fruits	20
Plants grow from seeds	23
Non-flowering plants	26
Coniferous trees	26
Ferns	27
Mosses and liverworts	27
Algae	27
Fungi	27
What plants need to grow well	28
Green plants make food	28
Leaves give out water	32

INTRODUCTION

Plants are very important living things. Life could not go on if there were no plants. This is because plants can make food from **air, water** and **sunlight**. Animals and Man cannot make food from air, water and sunlight. Animals get their food by eating plants and other animals. Man gets his food by eating plants and animals too. Therefore, animals and Man need plants in order to live. This is why we find that there are so many plants around us.

TYPES OF PLANTS

If you look carefully at the plants around you, you will find that there are many types of plants. Some plants are large while others are small. Most plants are green.

There are many types of plants around us.





Fruits and flowers help us to recognize the different plants.

There are two main types of plants:

1. **Flowering plants** and
2. **Non-flowering plants.**

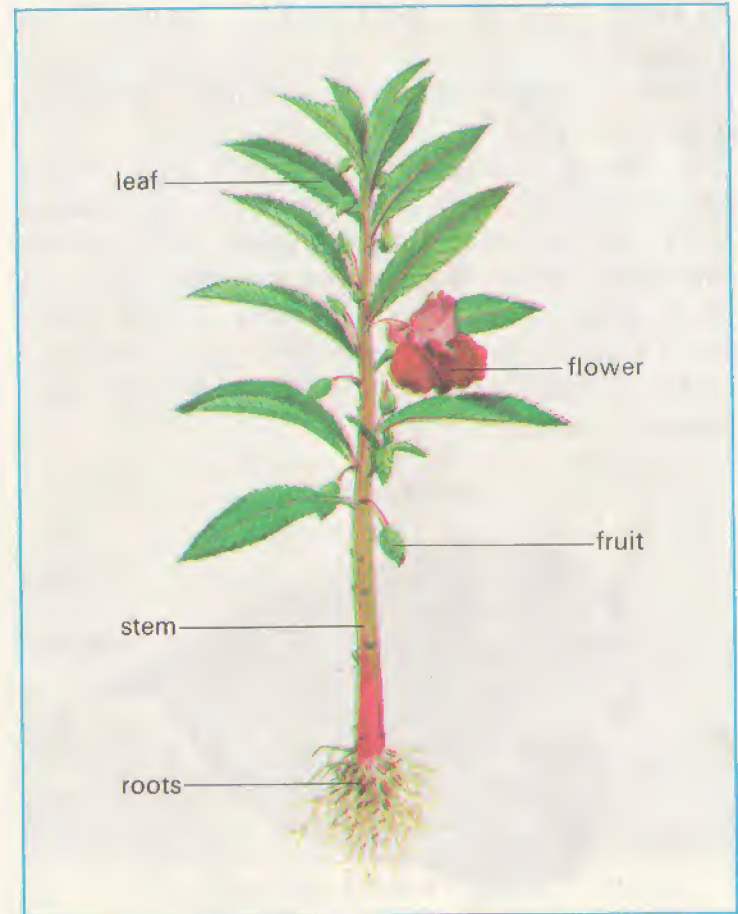
Flowering plants have **roots, stems, leaves, flowers and fruits.** Almost all the trees around us are flowering plants. You can probably recognize some plants from their flowers or their fruits.

Non-flowering plants do not grow flowers. They include **coniferous trees, mosses, liverworts, algae and fungi.** You cannot see many non-flowering plants around you.

PARTS OF A FLOWERING PLANT

Pull out a small flowering plant and look at it carefully. One part of the plant is found under the ground. This part is called the **root system.** The part of the plant which is above the ground is called the **shoot system.** The shoot system is made up of a number of parts:

- (a) the **stem** and its branches,
- (b) **leaves,**
- (c) **flowers** and
- (d) **fruits.**



Parts of a flowering plant

The picture shows all the different parts of a plant. Most plants have these parts. Now let us look carefully at the roots, stems, leaves, flowers and fruits of many types of plants.

PLANTS HAVE DIFFERENT TYPES OF LEAVES

This is a picture of a leaf. What is its colour and shape?

It has a **leaf stalk**. The leaf stalk is the part that is joined to the stem. The **leaf blade** is flat and smooth. In the middle of the leaf is the **main vein**. **Branch veins** grow from the main vein. The main vein and branch veins bring water to the leaf from the roots. They also carry the food made by the leaves to the other parts of the plant.

Parts of a leaf



Some plants have many small leaves. Others have only a few large leaves. There are many kinds of leaves. Leaves are of different shapes and colours.

Besides having different shapes and colours, leaves are also different in other ways. Some



Different types of leaves

leaves have short leaf stalks while others have long leaf stalks. Still others have no stalks at all. The edges of leaves are also different. Some leaves have smooth edges. Some have wavy edges. Others have edges like the teeth of a saw.

There are **simple leaves** and **compound leaves**. When there is only one leaf growing on a leaf stalk, it is called a simple leaf. When there are two or more leaves growing on a single leaf stalk it is a compound leaf.

Leaves are very useful to plants. On the surfaces of leaves are many tiny openings called **stomata**. Plants take in and give out gases like carbon dioxide and oxygen through the stomata.



This happens when plants make food in their leaves using sunlight, water and carbon dioxide.

Things to Do

- (i) Collect as many different kinds of leaves as you can find from various plants growing near your school or house. Bring along a plastic bag to keep your leaf collection.
Sort the leaves into simple and compound leaves. Look at the different parts of each leaf under a hand lens. Count the veins of each simple leaf and the number of leaflets of each compound leaf. Next draw each leaf. Label the different parts and talk about its shape and colour.
- (ii) You can make leaf prints in this way. Place a leaf on a white sheet of paper. Place another white sheet over the leaf. Using a pencil or crayon, rub over the top sheet of paper. When you have rubbed over the part of the paper that lies above the leaf you will see the outline of the leaf on the paper.
- (iii) Let's paint with leaves. Use a paint brush to spread a thin layer of paint on the upper surface of a leaf. Place the painted surface on a clean sheet of drawing paper. Press down on it gently with a clean piece of cloth. Carefully remove the leaf from the drawing paper. What do you see on the paper? You can paint with leaves of different shapes and sizes.

PLANTS HAVE DIFFERENT TYPES OF STEMS

Some plants have stems which are strong and upright. Others have stems which are thin and weak. Some of these weak stems creep on the ground. Others climb up sticks or other larger plants.

A creeping stem



A climbing stem



There are certain stems which remain underground. Sometimes these stems become swollen. This is because the plant uses these stems as a store-house. The plant stores all its extra food here. Therefore, the stem becomes swollen. Potatoes, onions and water chestnuts are good examples of stems that store food. Another example is the ginger. Some stems which grow above the ground also store food. An example is the sugar cane. The sugar cane stem stores sugar.



▲ ginger

► crocus

◄ potato



Examples of stems that store food

The stem holds the plant upright. The branches of the stem also hold the leaves up in such a way so that the leaves can get plenty of sunlight. In the stem, there are lots of little tubes which carry water and salts from the roots to the leaves. The leaves use the water and salts for making food when the sun is shining.

Things to Do

Collect for your nature table different types of stems. Sort them out into three groups:

- (a) strong and upright stems,
- (b) weak, creeping or climbing stems and
- (c) storage stems.

Draw and talk about them.

PLANTS HAVE DIFFERENT TYPES OF ROOTS

Roots are the underground parts of a plant. Some roots are small and weak. Others are big and strong.

In some plants, the roots are made up of many parts. They all grow from the lower end of the stem. These are called **fibrous roots**. Sometimes the roots are made up of a few main parts with smaller parts growing out from the main parts. Such roots are called **tap roots**.

Fibrous roots



Tap roots



Use a hand lens and examine the roots carefully. You will find small hair-like things near the root tips. These hair-like things are called **root hairs**.

There are some roots that store food. These roots are usually large and swollen. The sweet potato and carrot plants store food in their roots.

Roots have two main uses. They hold the plant firmly in the ground. They get water and salts for the plant from the soil.



Examples of roots that store food

Things to Do

Collect for your nature table as many types of roots as you can find. Try to collect the roots from plants that are less than one metre high. If the plants are big, cut off the top part of each of these plants. Take a plastic bag to keep your collection. Wash these roots carefully in water to remove the soil. Then sort them out into three groups:

- (a) fibrous roots,
- (b) tap roots and
- (c) food-storage roots.

Look at the roots carefully under a hand lens. Can you see the root hairs on the fibrous roots and tap roots? Count the number of plant parts in each set. Draw and label them.

Cut up samples from each of the different sets and look at the inside of each root with and without the hand lens. Do they look the same or different?

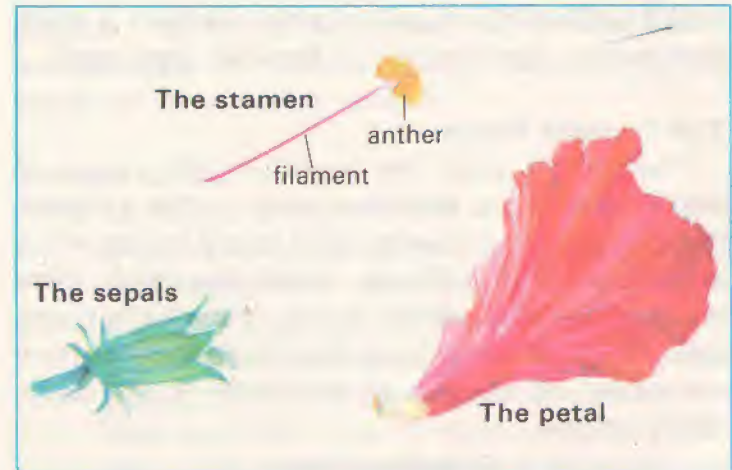
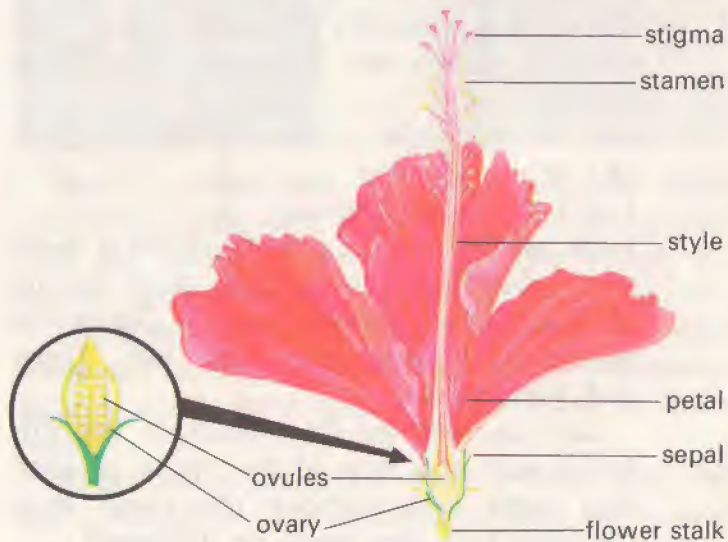
PLANTS HAVE FLOWERS

You have learnt that all flowering plants have roots, stems, leaves, flowers and fruits. Flowers are useful to us in many ways. One of them is that they help us to recognize the different types of plants which we find growing all around us.

Flowers have different shapes, sizes and colours. Each flower is attached to the stem by a **flower stalk**. In some plants, the flowers grow singly while in others the flowers may grow together in a bunch.

Most flowers have four parts — **petals**, **sepals**, **male parts** and **female parts**.

Section of a Hibiscus flower



The Petals

When you look at a flower you usually notice the petals first because they are brightly coloured. Different plants have petals of different colours. They attract insects or birds.

The Sepals

Below the petals, on the outside of the flower, are the sepals. They usually look like small leaves. They protect the flower bud.

The Male Parts

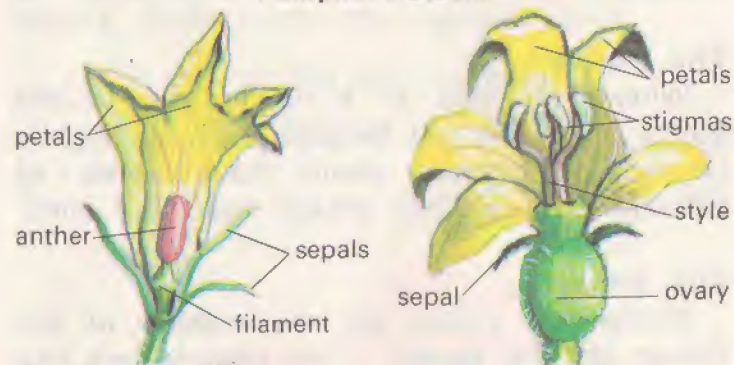
The stamens are the male parts of the flower. Some flowers have many small stamens while others have only a few. Each stamen has two parts — the **filament** and the **anther**. The anther, when ripe, produces a yellowish powder

called **pollen**. Each pollen grain contains a **male cell** which can fertilize a **female egg cell**.

The Female Parts

The female parts are found in the centre of the flower. There are three parts — the **stigma**, the **style** and the **ovary**. The ovary is a swelling at the base of the flower. Inside the ovary there are tiny **ovules**. Each ovule contains an egg cell. The style is a long thin stalk arising from the ovary. At the tip of the style is the hairy, sticky stigma.

Pumpkin flowers



The male flower

The female flower

Flowers with both male and female parts are called **bisexual flowers**. Examples of plants with bisexual flowers are the tomato, capsicum, convolvulus, cow pea and lily plants. Some flowers have stamens only. These flowers are called **male flowers**. Some only have the pistil and so they are called the **female flowers**. The

papaya, pumpkin, cucumber and watermelon are examples of plants where the male and female parts are on separate flowers.

Things to Do

- (i) Let's look at the parts of a flower. Collect a few simple complete flowers. Use a pair of scissors when possible to cut the flowers. Examine each one of the flowers carefully. Count all the different parts of each flower. Break off the petals and look at the parts that are left. Use a blade to cut open the ovary and look at the inside.

Can you see the male and female part of the flower? Draw the flowers and label the different parts.

- (ii) You can make a collection of pressed flowers as follows. Collect many different kinds of flowers. Place each flower between the pages of an exercise book or between sheets of newspaper. Place each collection between two boards and put heavy stones on top of the board. Leave your collection aside for one week.

After a week take them out and look at them carefully. What changes do you notice about the colour, thickness and dryness of the pressed flowers?

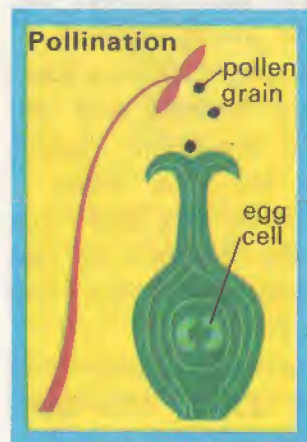
Display the pressed flowers nicely on a sheet of paper or a soft board. Use tapes or pins to fasten them onto the board.

FLOWERS BECOME FRUITS

Flowers are not only beautiful to look at but they can also become fruits and seeds. Before a flower can produce fruits and seeds, pollen grains from the anther must reach the egg cells inside the ovary. How do pollen grains reach the egg cells?

When the anthers are ripe, they burst open. A large number of pollen grains are found inside the anthers. These pollen grains are carried to the female part of the flower in several ways. They can be carried by wind, water or animals. The animals are usually insects like butterflies, moths or bees. When the pollen falls onto a stigma, **pollination** is said to take place.

After pollination, each pollen grain starts to grow into a long tube. The tube makes its way down the style until it reaches the ovary. In

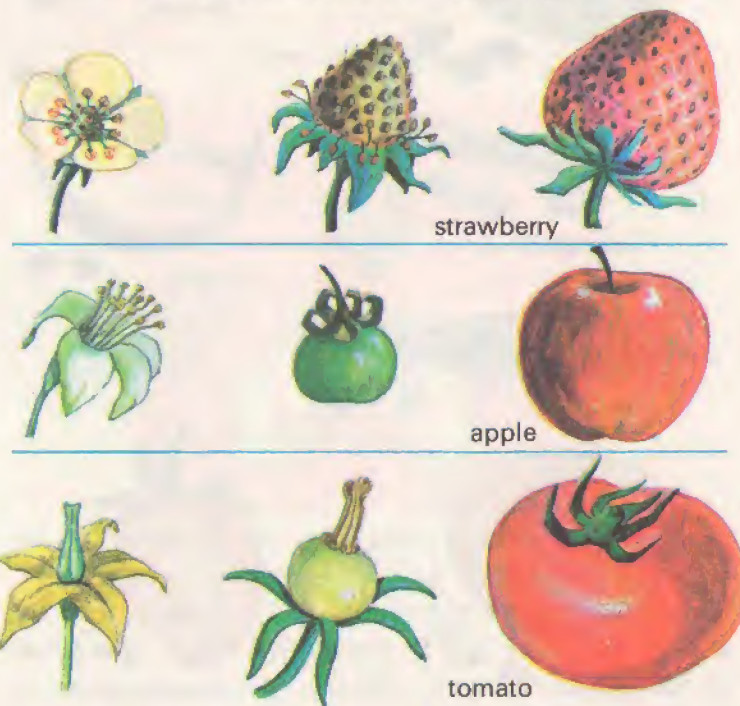


the ovary, the male cell from each pollen grain joins up with an egg cell. This is called **fertilization**.

When a flower is fertilized, the ovary becomes a fruit while the ovules become seeds. The seeds grow inside the fruit. The fruit protects the seeds until they are ripe.

Each plant has its own kind of fruits and seeds. Seeds are important because they can grow into new plants.

How some flowers become fruits



There are many types of fruits. Fruits differ in shape, colour and size. Some fruits are soft and fleshy. Others are hard and dry.

Some common fruits and their seeds

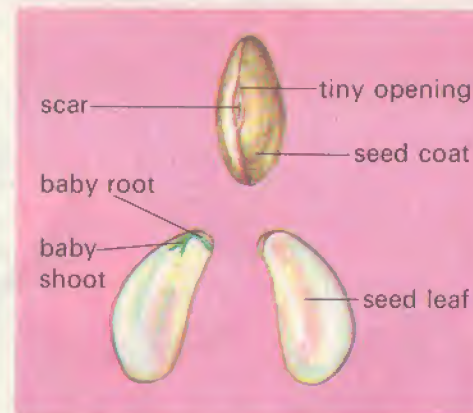


PLANTS GROW FROM SEEDS

You have learnt how flowering plants make seeds. The seeds are protected by the fruits. Some fruits have one seed, some have two, three or four, and some have many seeds. But a few fruits have no seeds at all. An example of a fruit without seeds is the banana fruit.

Seeds are of different shapes and sizes. Each seed is covered by a **seed coat**. In some seeds, like bean or maize seeds, you can find a scar and a very small hole on the seed coat. The **seed leaves** are found inside the seed coat.

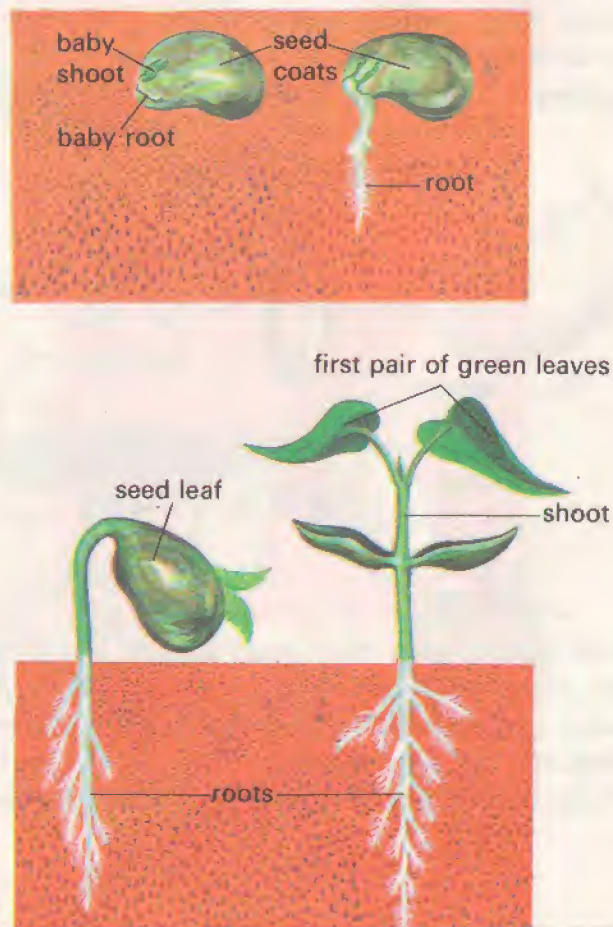
Parts of a bean seed



Most seeds have two seed leaves while some have only one seed leaf. The seed leaves contain stored-up food. A small dormant plant is present between the seed leaves. The baby plant has a baby shoot and a baby root. When there is

enough water, air and warmth, the baby plant will start to grow. This is called **germination**. In the beginning the baby plant will get its food from the seed leaves. When all the food in the seed leaves has been used up, the plant will make its own food.

This is how a young bean plant grows from a bean seed.



Things to Do

- (i) Let's find out what seeds are made up of. Soak some bean seeds (peanuts, peas, or soya beans) in water overnight. Place a soaked bean seed on a small sheet of paper. Turn the seed on its side and use a blade to cut through the seed coat. What do you find inside the seed coat?

Carefully cut around the edge of the seed and open up the seed leaves. Use a hand lens to look for the small dormant plant. Draw a picture of the inside of the seed and label the parts.

- (ii) Let's make dormant seeds grow. Thoroughly wet a piece of blotting paper, crinkle it up and put it in a tin lid. Place a few bean or maize seeds on the wet blotting paper.

You can also use soil to plant your seeds. Put some soil in a tin. Make a few holes in the soil about one centimetre deep with a pencil. Place one seed in each hole. Try to place the seeds in different positions. Water the seeds.

Look after the seeds for one whole week. Give them some water every day. What do you notice about the plants grown on paper and those grown in soil? Is soil needed for a seed to germinate? Do the roots and shoots of all the seeds grow in different directions?

NON-FLOWERING PLANTS

Most plants do not grow from seeds. They grow from **spores**. Spores are very, very small. Some spores are so small and light that they can float in the air. We may say that spores are quite similar to seeds. When these spores fall on wet and shady places, they usually grow into new plants.

1. CONIFEROUS TREES

Coniferous trees are seed-producing plants which have true roots and stems. Their leaves are usually needle-like or scale-like structures. They produce their seeds in **cones**. Larch, spruce, pine and cypress are examples of conifers.

Different types of non-flowering plants



coniferous trees



tree ferns

2. FERNS

Ferns have roots, stems and leaves. Their stems are swollen and grow just below the ground.

The spores can be found inside **spore-boxes** which are found on the undersides of the leaves.

3. MOSSES AND LIVERWORTS

Mosses only have leaves and stems which are usually erect. They have no roots. Mosses grow in wet, damp places, clinging to tree trunks, stones and walls.

Liverworts are small, flat, green leaf-like plants found in clusters in damp places.

4. ALGAE

Algae are very simple green plants. Their body structure does not have roots, stems and leaves. Algae also grow on the sides of ponds and on tree trunks. Some algae are very small, for example Spirogyra, while others like the seaweeds are very big.

5. FUNGI

Fungi are often not regarded as true plants because they are not green and cannot make their own food. They get their food from other plants and animals. Mushrooms and moulds are examples of fungi.

WHAT PLANTS NEED TO GROW WELL

Plants, like all living things, need **air**, **water** and **sunlight**. Plants do not grow well when they are close together. They need room to spread their roots to get water and to spread their leaves to get sunlight. But air, water and sunlight are not enough. Plants also need a certain amount of **warmth**. Plants will grow almost anywhere where there is plenty of air, water, sunlight and warmth.

You have seen how plants grow from seedlings. Do all the parts of the plant grow longer or does the plant only grow at the top?

Things to Do

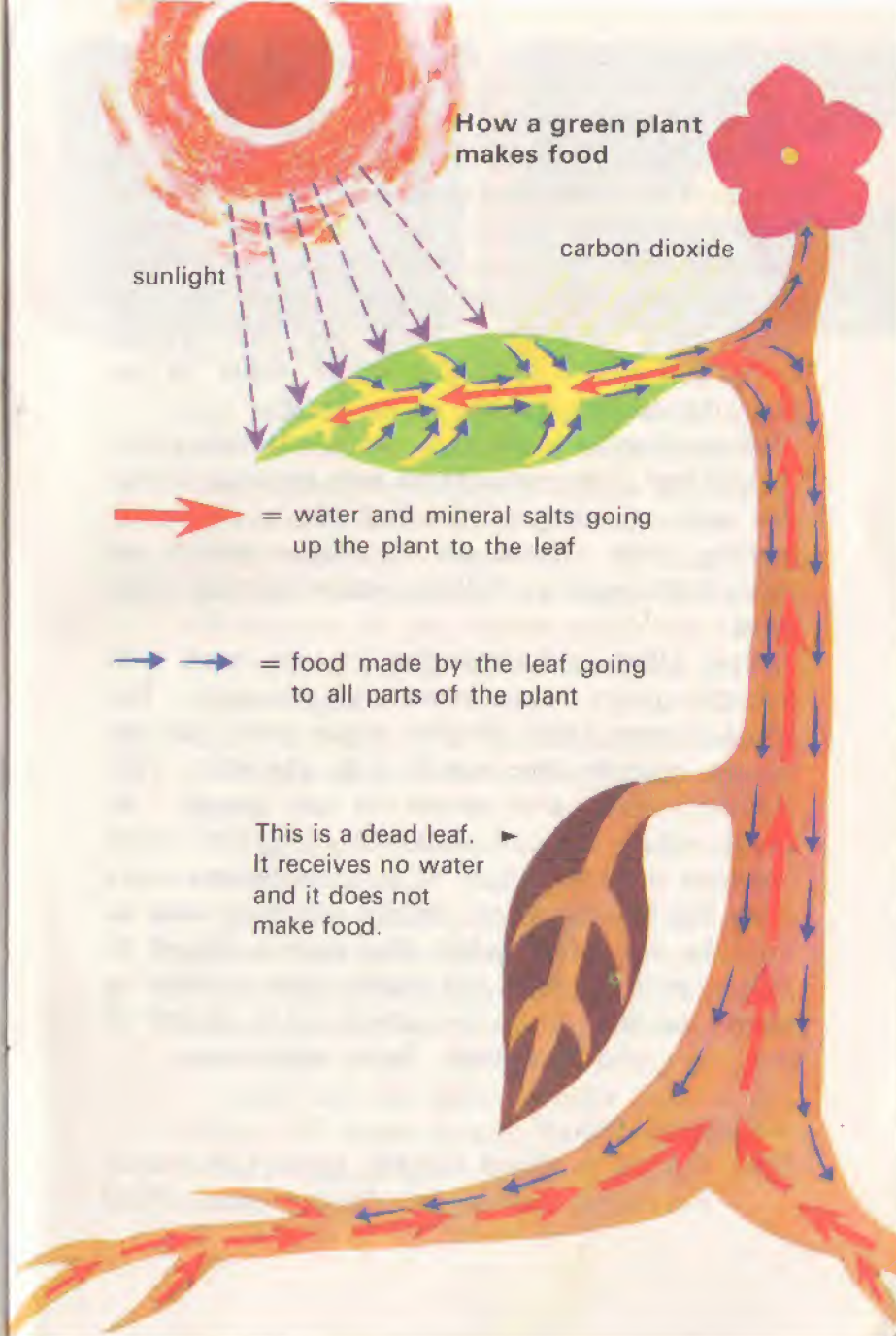
Let's record how a plant grows. Take a potted plant or a plant from the garden. Measure the height of the plant. Starting from ground level, mark lines on the stem with a red ink pen at intervals of 10 cm.

After one week measure the different sections again. How many cm. taller has the plant grown? How far apart are the marks? Which part of the stem has grown most?

GREEN PLANTS MAKE FOOD

Have you wondered why plants grow so many leaves? And why most leaves are green in colour?

The answer is that plants need these green



leaves to make food. | A plant needs **sunlight** and **carbon dioxide** from the air for making food. The plant also needs **water** and **salts** from the soil to make food. There are certain cells in the leaves which change carbon dioxide and water into sugar. To do this the cells need **energy**. They get this energy from sunlight. At night when there is no sun, the leaves do not make food. |

Green leaves make food for the whole plant. A red leaf can make food too because under the red colouring of the leaf there are food-making cells. There are no leaves which are completely yellow. Yellow leaves cannot make food.

| The plant makes **sugar** for its food. In sunlight green leaves make a lot of sugar. The veins cannot carry all this sugar away, so the leaves change the sugar into **starch**. | This starch is kept and stored in the leaves. At night, when the sun is not shining, the starch changes back to sugar. It is then carried away from the leaves. Some of the sugar is used as food by the plant while the rest is stored as starch in the plant. In some plants, food is stored in the roots, in others it is stored in the stem and in leaves, fruits and seeds.

Things to Do

- (i) Collect seeds of tomato, papaya or maize. Put some soil in two flower pots. Plant



To find out the effect of light on plant growth.

the seeds in the soil and sprinkle them with water. Put one pot in a dark cupboard and the other under a cardboard box with a hole on one side. Water the seeds everyday. Leave them for one week and then examine them carefully. What differences do you notice about the plants in the two pots? What does the experiment show?

- (ii) Let's find out what foods contain starch. Place about half a teaspoonful of starch, sugar and salt in three separate tin lids. Add a drop of iodine to each and record what happens.

Only the starch turns blue-black. This shows that only starch will give a blue-black colour with iodine. If anything gives a blue-black colour with iodine, there must be starch in it.

Carry out the same activity to find out which of these foods contain starch — bread, rice, sugar cane, coconut, peas, beans, meat and potatoes.

LEAVES GIVE OUT WATER

Water is very important to plants. The plant gets water from the soil. This water is taken in by the roots to the leaves where it is used for making food.

Some of the water which is taken in is lost through tiny openings present on the leaf surfaces. On a hot and windy day, the plant loses a lot of water through the tiny openings on the leaves. This water is lost as **water vapour**. Water vapour is liquid water which has changed into gas. This water vapour can change back into liquid water easily. When water is lost from the leaves, heat is also removed from the plant. So loss of water through the leaves helps to cool the plant.

If too much water is lost and there is not enough water in the soil to replace it, then the plant will die.

Things to Do

Collect a few plastic bags and some strings. Go out into the garden and tie each plastic bag over a leafy branch. Now remove the leaves from a few other branches. Tie a few more bags on these leafless branches. Leave all the bags on the plant for a few hours. Then go back and examine the bags carefully. Which of the bags contain water? What does this experiment show?